



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,995	07/28/2003	Arnold M. Frisch	CRED 2618	7355

7812 7590 02/24/2006

SMITH-HILL AND BEDELL, P.C.
16100 NW CORNELL ROAD, SUITE 220
BEAVERTON, OR 97006

EXAMINER

RADOSEVICH, STEVEN D

ART UNIT	PAPER NUMBER
----------	--------------

2138

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/628,995	FRISCH, ARNOLD M.	
	Examiner	Art Unit	
	Steven D. Radosevich	2138	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 19-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 26-28 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10-28-03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-28 are being presented for a combination/subcombination restriction.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-18 and 26-28, drawn to an apparatus for responding to each edge of an input strobe signal by generating a corresponding edge in each of first and second strobe signals, wherein corresponding in the first and second strobe signals are separated by a target delay, classified in class 714, subclass 700 (skew detection/correction).
- II. Claims 19-25, drawn to a built-in self-test (BIST) circuit embedded in an integrated circuit (IC), classified in class 714, subclass 733 (Built-in test circuit (BILBO)).

Inventions [I] and [II] are related as combination and subcombination. Invention in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP 806.05(c)).

In the instant case, the combination (I) as claimed does not require the particulars of the subcombination (II) as claimed because the combination does not require, "a BIST cell for producing a state change in the path input signal and for thereafter sampling the path output signal to determine its state, wherein the state change and the sampling are separated in time by the target delay and are initiated by

corresponding edges in first and second strobe signals also separated in time by the target delay”.

The second part of the combination/subcombination requirement is that the subcombination has utility by itself or in other combinations. In the instant case, the subcombination could be used in “A built-in self-test (BIST) circuit embedded in an integrated circuit (IC) for determining whether a state change in a path input signal supplied to an input of a signal path within an integrated circuit (IC) produces a state change in a path output signal appearing at an output of the signal path with a delay exceeding a target delay indicated by input data”.

Because the inventions are distinct for the reasons given and have acquired at least two separate classifications in the art, restriction for examination purposes is proper.

During a telephone conversation with Daniel Bedell on 1/30/06 a provisional election was made with no traverse to prosecute the invention of Arnold Frisch, claims 1-18 and 26-28. Affirmation of this election must be made by applicant in replying to this Office action. Claims 19-25 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

Claim 9 is objected to because of the following informalities: There is a grammatical error in line 10 of the claim. The claim reads “when he gate” when it is believed it was intended to read “when the gate” and is being treated as such for this examination. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 recites the limitation "the second multiplexer output signal" in line 3 of the claim. There is insufficient antecedent basis for this limitation in the claim. For the purposes of this examination the "second multiplexer output signal" will be treated, as being the "first strobe signal" from claim 13, which claim 16, is dependent on.

Claim 26 recites the limitation "the first circuit" in line 28 on the claim. There is insufficient antecedent basis for this limitation in the claim. For the purposes of this examination "the first circuit" will be treated as "a first circuit" since there is no prior reference to "a first circuit" being that this is an independent claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 10-18, and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Bauer et al. (US 6798241 B1).

As per claim 1, Bauer teaches an apparatus (500 – figure 5) for responding to each edge of an input strobe signal (D0 – figure 5) by generating a corresponding edge

in each of first and second strobe signals (see figure 5 and figures 7A-7E), wherein corresponding edges in the first and second strobe signals are separated by a target delay referenced by input data (see figures 7C-7E and columns 2-3), the apparatus comprising:

A first multiplexer (520 – figure 5) for receiving the input strobe signal and the first and second strobe signals (see figure 5), and for providing any one of the input, first and second strobe signals selected by first selection control data as a first multiplexer output signal (see figure 5);

A first circuit (530 – figure 5) for generating the first and second strobe signals in response to the first multiplexer output signal such that each edge in the first multiplexer output signal subsequently produces a corresponding edge in the first and second strobe signals (see figures 7A-7E), with corresponding edges in the first and second strobe signals being separated in time by a programmable delay set by delay control data (see figure 5, figures 7C-7E, and column 5), and

A control circuit receiving the input data and the first multiplexer output signal for supplying the first selection control data to the first multiplexer and for supplying the delay control data to the first circuit (columns 2-3).

As per claim 2, Bauer teaches the apparatus in accordance with claim 1 wherein the control circuit carries out a calibration process wherein it sets the delay control data so that the programmable delay between corresponding edges of the first and second strobe signals matches the target delay referenced by the input data (columns 2-3).

As per claim 3, Bauer teaches the apparatus in accordance with claim 2 wherein following the calibration process, the control circuit sets the first selection control data so that the first multiplexer provides the input strobe signal as the first multiplexer output signal such that a next edge of the input strobe signal will result in corresponding edges in the first and second strobe signals separated in time by the target delay (columns 2-3).

As per claim 10, Bauer teaches the apparatus in accordance with claim 1 wherein the first circuit comprises:

A tapped delay line having N taps for conveying the first multiplexer output signal to each of its N taps in succession, where N is greater than two (see figure 5 and column 5 lines 1-2);

A second multiplexer (520 – figure 5) for providing the first multiplexer output signal conveyed to any one of the N taps selected by the delay control data as a second multiplexer output signal (see figure 5); and

First means for generating the first strobe signal in response to the second multiplexer output signal (see figure 5).

As per claim 11, Bauer teaches the apparatus in accordance with claim 10 wherein the first circuit further comprises:

Second means for generating the second strobe signal in response to the first multiplexer output signal with a delay substantially matching a delay between an edge of the first multiplexer output signal arriving at any tap selected by the delay control data

and a corresponding edge of the first strobe signal generated by the second means (see figure 5).

As per claim 12, Bauer teaches the apparatus in accordance with claim 10 wherein the first circuit further comprises:

A third multiplexer for providing the first multiplexer output signal conveyed to any one of the N taps selected by the delay control data as a third multiplexer output signal, wherein the delay control data independently controls the tap selection made by the second and third multiplexer (see figure 5 and column 12); and

Second means for generating the second strobe signal in response to the third multiplexer output signal (see figure 5).

As per claim 13, Bauer teaches the apparatus in accordance with claim 1 wherein the first circuit provides a first signal path for delaying the first multiplexer output signal with a first delay to produce the first strobe signal, the first delay being controlled by the delay control data (see figure 5),

Wherein the first signal path includes a first number of gates (see figure 5),

Wherein the delay control data controls a magnitude of the first number (see figure 5 and column 5),

Wherein the first delay is a function of a sum of delays through the first number of gates (see figure 5).

As per claim 14, Bauer teaches the apparatus in accordance with claim 13 wherein a delay through each gate of the first number of gates is a function of the delay of the delay control data (see figure 5).

As per claim 16, Bauer teaches the apparatus in accordance with claim 13 wherein the first circuit provides a second signal path for delaying the second multiplexer output signal with a second delay to produce the second strobe signal, the second delay being controlled by the delay control data (see figure 5),

Wherein the second signal path includes a second number of gates (see figure 5),

Wherein the delay control data controls a magnitude of the second number (see figure 5), and

Wherein the second delay is a function of a sum of delays through the second number of gates (see figure 5 and column 5).

As per claim 17, Bauer teaches the apparatus in accordance with claim 16

Wherein a delay through each gate of the first number of gates is variable and a function of the delay control data (columns 4-5 and column 12 lines 45-48), and

Wherein a delay through each gate of the second number of gates is variable and a function of the delay control data (columns 4-5 and column 12 lines 45-48).

As per claim 18, the apparatus in accordance with claim 16

Wherein the first signal path comprises a first variable capacitor (column 5 lines 1-2 and column 12),

Wherein the delay control data controls a first capacitance of the first variable capacitor (column 5 and column 12 lines 45-48), and

Wherein the first delay is a function of the first capacitance (see figure 5),

Wherein the second signal path comprises a second variable capacitor (column 5 lines 1-2 and column 12),

Wherein the delay control data controls a second capacitance of the second variable capacitor (column 5 and column 12 lines 45-48), and

Wherein the second delay is a function of the second capacitance (see figure 5).

As per claim 26, Bauer teaches an apparatus for responding to each edge of an input strobe signal (D0 – figure 5) by generating a corresponding edge in each of first and second strobe signals (figures 7A-7E, columns 2-3, and column 5 lines 46-48), wherein corresponding edges in the first and second strobe signals are separated by a target delay referenced by the input data (see figures 7C-7E, figure 5, and columns 2-3), the apparatus comprising:

Means for generating an edge of the first strobe signal in delayed response to each edge of the input strobe signal (see figure 5 and figures 7C-7E);

A first multiplexer (520 – figure 5) for receiving the input strobe signal and the second strobe signal (see figure 5) and for providing either one of the input and second strobe signals selected by the first selection control data as the first multiplexer output signal (see figure 5 and columns 4-5);

A tapped delay line comprising a plurality of gates connected in series for receiving the first multiplexer output signal (see figure 5 and column 5 lines 1-2) and producing an edge in a separate tap signal at an output of each gate in delayed response to each edge in the first multiplexer output signal (see figures 7C-7E and

column 4), wherein a signal delay through each gate is a function of voltage supplied to the gates (column 12);

Means for adjusting the voltage supplied to the gates in response to delay control data (column 12 and columns 2-3);

Means for receiving the tap signal produced by each gate as input (520 – figure 5), for selecting one of the tap signals as a selected tap signal in response to the delay control data (see figure 5 and columns 4-5) and for generating an edge in the second strobe signal in response to each edge in the selected tap signal (see figures 7C-7E);
and

A control circuit receiving the input data and the first multiplexer output signal for supplying the first selection control data to the first multiplexer and for supplying the delay control data to the first circuit, wherein the first selection control data and the delay control data are functions of the input data (columns 2-3).

As per claim 27, Bauer teaches the apparatus in accordance with claim 26 wherein the control circuit carries out a calibration process wherein it sets the delay control data so that a delay between corresponding edges of the first and second control signals match the target delay referenced by the input data (column 2-3).

As per claim 28, Bauer teaches the apparatus in accordance with claim 27 wherein the calibration process comprises setting the first selection control data so that the first multiplexer selects the second strobe signal as the first multiplexer output signal and measuring a period of the first multiplexer output signal (columns 2-3 and see figure 7C and 13A).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer et al. (US 6798241 B1) as applied to claim 2 above, and further in view of Gillis et al. (6058496).

As per claim 4. Bauer teaches the apparatus in accordance with claim 2 as described above in this action.

Bauer does not specifically teach while during the calibration process the control circuit generates count data indicating a difference between first and second quantities, wherein the first quantity is a number of edges of a reference clock signal occurring during a first period determined by counting a predetermined number of edges of the first multiplexer output signal occurring while the first multiplexer providing the first strobe signal as the first multiplexer output signal, and wherein the second quantity is a

number of edges of a reference clock signal occurring during a second period determined by counting the predetermined number of edges of the first multiplexer output signal.

However in an analogous art, Gillis teaches measurements (frequency and period) taken from two signals at two distinct times and then obtaining a difference between the two measurements in-order to adjust a programmable delay to a desired delay value (column 7).

Therefore, one would be motivated to combine the teaches of Bauer with Gilles' teachings in instances where it is desired to have signals stepwise separated in time until a desired signal is centered/delayed over an edge of another signal as indicated by Bauer (column 2).

As per claims 5 and 7, Gillis teaches the apparatus wherein during the calibration process the control circuit iteratively carries out a process of generating the count data, comparing the count data to the input data, and adjusting the delay control data to determine a value for the delay control data that sets the programmable delay equal to the target delay (column 7 lines 34-55).

As per claim 6, Bauer teaches the apparatus in accordance with claim 4 wherein the control circuit decrements the count data in response to edges of the reference clock signal during the first period and increments the count data in response to edges of the reference clock signal during the second period (column 4).

As per claim 8, Bauer teaches the apparatus in accordance with claim 7 wherein following the calibration process, the control circuit sets the first selection control data

so that the first multiplexer provides the input strobe signal as the first multiplexer output signal such that a next edge of the input strobe signal will result in corresponding edges in the first and second strobe signals separated in time by the target delay (column 2-3).

As per claim 9, the apparatus in accordance with claim 6 wherein the control circuit comprises:

A first counter for counting edges of the first multiplexer output signal and for generating a gate signal indicating when the first and second periods are occurring (Bauer: columns 4-5);

A second counter for decrementing the count data in response to edges of the reference clock signal when the gate signal indicates the first period is occurring and for incrementing the count data in response to edges of the reference clock signal when the gate signal indicates the second period is occurring (Bauer: columns 4-5); and

Means for incrementing or decrementing the delay control data depending on relative magnitudes of the count data and the delay data (Gillis: column 7).

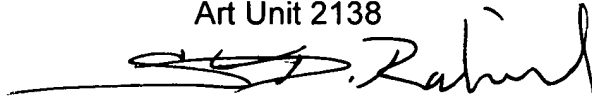
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven D. Radosevich whose telephone number is 571-272-2745. The examiner can normally be reached on 9am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on 571-272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Steven D. Radosevich
Examiner
Art Unit 2138



ALBERT DEADY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2138